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## On the early stages of *Pontia chloridice* Hbn. in East Turkey, with some phenological comments (*Lepidoptera, Pieridae*)

Muhabbet Kemal Ahmet Ömer Koçak

**Abstract:** On the early stages of *Pontia chloridice* Hbn. in East Turkey, with some phenological comments (*Lepidoptera, Pieridae*). *Cesa News* 88: 1-13, 19 figs., 1 Table, 1 map.

In this paper, detailed pictorial information of the early stages of spring generation of *Pontia chloridice* Hbn. are given, based upon field studies of the authors in Van and Diyarbakır Provinces (East Turkey). Distributional status, food-plants of caterpillar and adult, as well as phenology, generation concept are mentioned and discussed.

**Key words:** *Pontia chloridice*, egg, larva, pupa, adult, food-plants, distribution, early stages, *Pieridae, Lepidoptera*.

*Pontia chloridice* Hbn is one of the generally uncommon, locally distributed butterfly in Turkey with two or three annual generations. The species is apparently confined to the southern hot valleys, also dry habitats, preferably below 1500m (up to 2300m) high above sea level, usually with low number of individuals in populations. Feeding biology of the species was little studied in Turkey, so far. Hesselbarth et al. (1995) illustrated a female and a fully developed caterpillar from Anamur (İçel Prov.). Seven,S. (2000) reported *Senecio vernalis* as adult food-plant from Kırıkkale Province (Central Anatolia). Distributional information in Turkey are given by the authors (Koçak & Kemal, 2006, 2007, 2008, 2009). Kayci (2007) stated this species from Erek Mountain (Van Province). Seven,E. (2010) reported this species as common from Sirvan District (Siirt Province, SE Turkey). In Muğla Province (Boynuzcuk), author illustrated a female during feeding (Kemal & Koçak, 2011). In Van Province the species is mentioned in two recent lists (Koçak, Kemal & Kayci, 2011; Koçak & Kemal, 2012a), and also reported once more in İğdır Province (Koçak & Kemal, 2012b). Aydın (unpublished) recorded this species in Kulp district (Diyarbakır Prov., SE

Turkey). John et al. (2013) gave important information on the larval food-plants of Cypriot *Pontia chloridice* Hbn., and discussed the breeding subjects in detail. Only last instar of the caterpillar and adult male were illustrated from Troodos Mountains. A map of *Pontia chloridice* Hbn, based upon info-system of the Cesa is given (**Map 1**).

In 2009, the authors had two opportunities to observe this species in East Turkey. Around Taşköprü 840m in the district Kulp (Diyarbakır Prov.) (**Figs. 1,2**), together with M. Aydin, female butterfly was observed during feeding on *Valerianella* sp. (Valerianaceae). In Van Province, around Akçabük 1690m (Çatak district) a female was observed during feeding on a species of Dipsacaceae (**Fig.3**). Besides, the egg-laying behaviour of the female butterfly on the young *Cleome ornithopodioides* L.<sup>1</sup> [det. L. Behçet] (Cleomaceae) were also photographed two times *in situ* (**Figs.4-6**). The eggs together with its food-plant placed in a proper plastic box, and reared until the butterfly emerges under the room temperature. Pictorial information on the development stages, egg, all instars of larval development, pupa and adult female are given below (**Figs.7-19**).

Larval instar with visible wings - the most interesting abnormal growing of the last instar of a caterpillar, with the traces from the future, namely anterior and posterior wings are almost visible inside of the second and third segments of the thorax in the larval stadium (**Fig.13**). This ontogenetic case, appeared spontaneously without external intervention, is illustrated here for the first time in our geography.

#### Comments on phenology and generations in butterflies:

Life cycle is defined by four distinct development stages of a butterfly species, i.e., the egg, caterpillar, chrysalis, and adult. A generation (brood) depends upon the geographical location, where the species lives. Usually, we call a species single- brooded, or univoltine, when it's life cycle is completed in a year. Double-brooded, bivoltine, or multivoltine species may be similarly expressed, depending on the number of the life cycles in a year.

The problem is when the first generation of a butterfly begins. The egg is the first life cycle stage of an individuum. Let's see the phenological diagram of *Pontia chloridice* (**Table 1**). Tolman (1997: 42) stated flight period of *Pontia chloridice* as follows (this is more or less an universal expression):

**Flight-period:** "Bivoltine, mid April/late May, and June/July in prolonged emergence".

As it is seen above, flight-period defines an activity of the adult. In this species, adult appears two times in a year, in the spring, and in the summer seasons. In fact, adults, flying in the spring, are the specimens developed from the eggs, larvae, and pupae of the previous summer and autumn seasons. Can it also be expressed as first-brood (or generation), when adult flies in the spring, or not? (**Table 1**).

**Table 1** – Phenology according to the life cycle of *Pontia chloridice* (adopted from Tolman 1997; Makris 2003). Development period of a specimen of *Pontia chloridice* in a generation, from an egg laid in October (green), and another specimen in other generation, from an egg laid in May (blue). Currently used expression for generations (yellow).

Generations	First generation						Second generation					
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Months												
Egg					+					+		
Larva					+	+	+			+	+	
Pupa	+	+	+				+	+			+	+
Adult				+	+	+		+	+			

As it may be easily seen that there is a discordance between the progress of the life cycle of the butterfly, and the seasons of the year. In other words, the spring may be considered the first season of the year, but the first two months, January and February, belong to winter. As to the "first" brood of *Pontia chloridice*, we see the adults in March-May, but yet, they appear first from their eggs in previous October, that is to say, in the "second" brood period of the previous year.

<sup>1</sup> In Turkey, *Cleome ornithopodioides* is known as food-plant of this species (Hesselbarth et al.,1995).

When we evaluate the phenological information given in Table 1, we see the “first” brood of *P. chloridice* from October to end of May [autumn + winter + spring], and the “second” brood from May to October [late spring + summer + autumn]. As a result of this evaluation, we are of the opinion that flying butterflies in March-May, belong to the second brood of the previous year; butterflies, flying between June-October, belong to the first generation of this year. This problem appears in the group of the butterflies and moths, if their pupae hibernate.

Of course, the phenological definition of the broods should be discussed in details. A scientific solution is very much appreciated.

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**Fig. 1** – *Pontia chloridice* (female) during feeding on *Valerianella* sp. (Valerianaceae). Turkey, Diyarbakır Prov., Kulp Taşköprü 840m, 16.5.2009, M.Kemal (Cesa).



**Fig. 2** – Habitat. Sarım stream (Diyarbakır Prov., Kulp Taşköprü 840m), where *Pontia chloridice* was observed on 16.5.2009, M.Kemal (Cesa)



**Fig. 3** – *Pontia chloridice* female feeding on a species of *Dipsacaceae*. Turkey, Van Prov., Çatak, Akçabük 1690m 9 6 2009, M Kemal (Cesa)



**Fig.4** – *Pontia chloridice* female laying egg on leaves of *Cleome ornithopodiooides* (*Cleomaceae*). Turkey, Van Prov., Çatak, Akçabük 1690m 9 6 2009, M Kemal (Cesa)



**Fig. 5** – *Pontia chloridice* female laying egg on leaves of *Cleome ornithopodioides* (Cleomaceae). Turkey, Van Prov., Çatak, Akçabük 1690m 9 6 2009, M Kemal (Cesa) [two eggs marked with red arrow]



**Fig. 6** – *Cleome ornithopodioides* [det. L. Behçet] (Cleomaceae), together with an egg laid by *Pontia chloridice*. Turkey Van Prov., Çatak Akçabük 1690m, 9 6 2009, M Kemal (Cesa)



**Fig. 7** – Newly hatched caterpillar of *Pontia chloridice* on 14 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 8** – Second instar caterpillar of *Pontia chloridice* on 16 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 9** – Third instar caterpillar of *Pontia chloridice* on 19 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 10** – Fourth instar caterpillar of *Pontia chloridice* on 20 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 11**– Fourth instar caterpillars of *Pontia chloridice* on 21 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 12**– Dorsal view of the fifth instar caterpillar of *Pontia chloridice* on 25 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 13**– Lateral view of the fifth instar caterpillar of *Pontia chloridice* on 25 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 14**– Ventro-lateral view of the pre-pupa of *Pontia chloridice* on 28 6 2009 on natural food-plant in captivity, M Kemal (Cesa). An abnormal growing and the traces from the future: on second and third segments wing shapes and patterns are visible (red arrow). Unfortunately this specimen couldnot be fully developed.



**Fig. 15**– Dorsal view of the same pre-pupa of *Pontia chloridice* on 28 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 16**– Lateral view of the female pupa of *Pontia chloridice* on 28 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



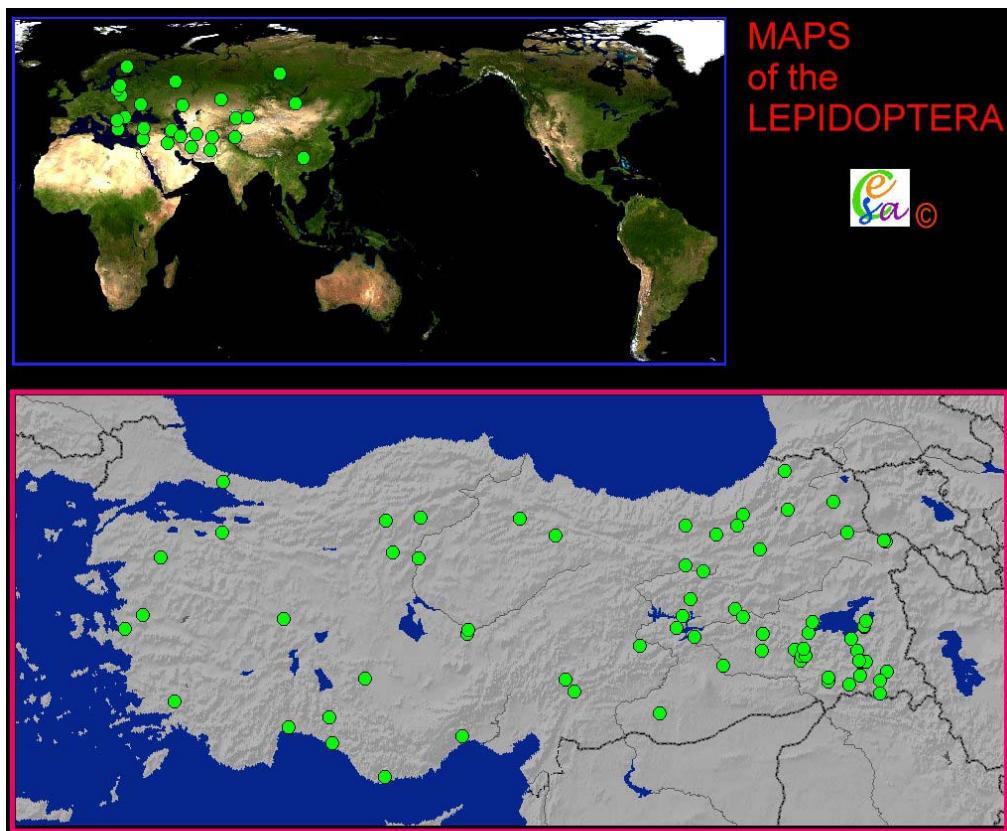
**Fig. 17-** Dorsal view of the female pupa of *Pontia chloridice* on 28 6 2009 on natural food-plant in captivity, M Kemal (Cesa)



**Fig. 18-** Newly emerged female *Pontia chloridice* on 6 7 2009 in captivity, M Kemal (Cesa)



**Fig. 19**– Newly emerged female *Pontia chloridice* on 6.7.2009 in captivity, M Kemal (Cesa)



**Map 1** - *Pontia chloridice* Hbn. (Pieridae). Distribution based upon the info-system of the Cesa.

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## On the occurrence of *Archon apollinaris* (Stgr.) in Van Province (East Turkey) (*Lepidoptera, Papilionidae*)

**Muhabbet Kemal Ahmet Ömer Koçak**

**Abstract:** On the occurrence of *Archon apollinaris* (Stgr.) in Van Province (East Turkey) (*Lepidoptera, Papilionidae*). *Cesa News* 88: 14-21, 10 figs., 1 map.

In this paper, occurrence of *Archon apollinaris* (*Papilionidae*) and its larval food-plant *Aristolochia bottae* (*Aristolochiaceae*) is discussed. Illustrations of *Aristolochia bottae*, caterpillar, pre-pupa, and pupa of *Archon apollinaris* are given. A distributional map of *Archon apollinaris* in East Turkey is also added.

**Key words:** *Archon apollinaris*, *Aristolochia bottae*, *Papilionidae*, *Aristolochiaceae*, fauna, *Lepidoptera*, Turkey, Van.

“*Doritis apollinus* var. *apollinaris*” was described by Staudinger in 1892<sup>2</sup> from “Goman Otti, im nordöstlichen Kleinasien etwa 1500m hoch”, a place visited by the collector Dr. Plason, which is currently considered in the province Erzincan (NE Turkey). Koçak (1982) published a detailed article on the distribution and the larval biology of *Archon apollinus* in Turkey. Koçak (1989) also established a subtribal taxon for the genus *Archon* Hbn. The subspecific status of *apollinaris* was changed by de Freina (1985) to a distinct species, which is currently considered as a correct action. *Archon apollinaris* (Stgr.) is widely distributed especially in the provinces of SE Turkey, in the cultivated areas, strictly depending on the occurrence its larval food-plant *Aristolochia bottae* (*Aristolochiaceae*) (Koçak & Kemal, 2007, 2009). It is interesting that *Aristolochia* is a common plant in SE Turkey, but almost completely absent in NE Turkey. According to Davis & Khan (1982), a single occurrence of *Aristolochia bottae* from 2km S of Adilcevaz (Bitlis Prov.) is reported in the northern part of Van Lake. In the eastern territories of Erzurum city, Ağrı, İğdir, Kars and Ardahan provinces there is no *Aristolochia* record in the floristic publications. Consequently, there is also no *Archon apollinaris*, or *Allancastria deyrollei* (Obth.) (another species of *Aristolochia* dependent) in these provinces.

In Van province, Hesselbarth et al. (1995) reported a single record of the year 1912 from the vicinity of Van. Present authors recorded this species especially in the southern mountainous region of Van Lake basin, including Çatak district. They also observed *Archon apollinaris* butterflies during feeding on *Muscati* flowers in May at Kurubaş (Van Prov.). Özkol (2007) reported it in Gevaş district (Balaban, Dokuzağac, Uysal). Kayci (2007) mentioned its occurrence in Erek Mountain (Hoşpurak and Sarmaç).

Present authors recorded the young caterpillars of *Archon apollinaris* on its food-plant *Aristolochia bottae* at Ermişler 1670m (NE of Van Lake), a place in the north-easternmost territory in this region.

Distribution of *Archon apollinaris* in Van Province, Turkey, and in abroad are given below (**Map 1**). Pictorial descriptions of the food-plant, caterpillar, pre-pupa, and pupa of *Archon apollinaris* are also given here (**Figs. 1-10**).

<sup>2</sup> *Doritis apollinus* var. *apollinaris* Staudinger, [1892], Dt. ent. Z., Iris 4: 225. Syntypes: [Türkei: Erzincan Prov.]: nordöstlichen Kleinasien: Goman Otti, 1500m., lectotype designated by Wagener (1995).



**Fig. 1** – *Aristolochia bottae* (Aristolochiaceae). Food-plant of *Archon apollinaris* (Stgr.) (Papilionidae). Turkey, Van Prov., Ermisler 1670m (ca. 25km SW Muradiye), 20 5 2007, M.Kemal (Cesa)



**Fig. 2** – Flowers of *Aristolochia bottae* (Aristolochiaceae). Turkey, Van Prov., Ermisler 1670m (ca. 25km SW Muradiye), 20 5 2007, M.Kemal (Cesa)



**Fig. 3** – Young caterpillar inside of a leaf on *Aristolochia bottae* (Aristolochiaceae). Turkey, Van Prov., Ermişler 1670m (ca. 25km SW Muradiye), 20.5.2007, M.Kemal (Cesa)



**Fig. 4** – Deformed leaf of *Aristolochia bottae* by caterpillar of *Archon apollinaris*. Turkey, Van Prov., Ermişler 1670m (ca. 25km SW Muradiye), 20.5.2007, M.Kemal (Cesa)



**Fig. 5** – Deformed leaf of *Aristolochia bottae* by caterpillar of *Archon apollinaris*. Turkey, Van Prov., Ermişler 1670m (ca. 25km SW Muradiye), 20.5.2007, M.Kemal (Cesa)



**Fig. 6** – Young caterpillar of *Archon apollinaris*, with blackish ground colouration. Turkey, Van Prov., Ermişler 1670m (ca. 25km SW Muradiye), 20.5.2007, M.Kemal (Cesa)



**Fig. 7** – Grown caterpillar of *Archon apollinaris*, with greyish ground colouration. In captivity, 23 5 2007, M.Kemal (Cesa)



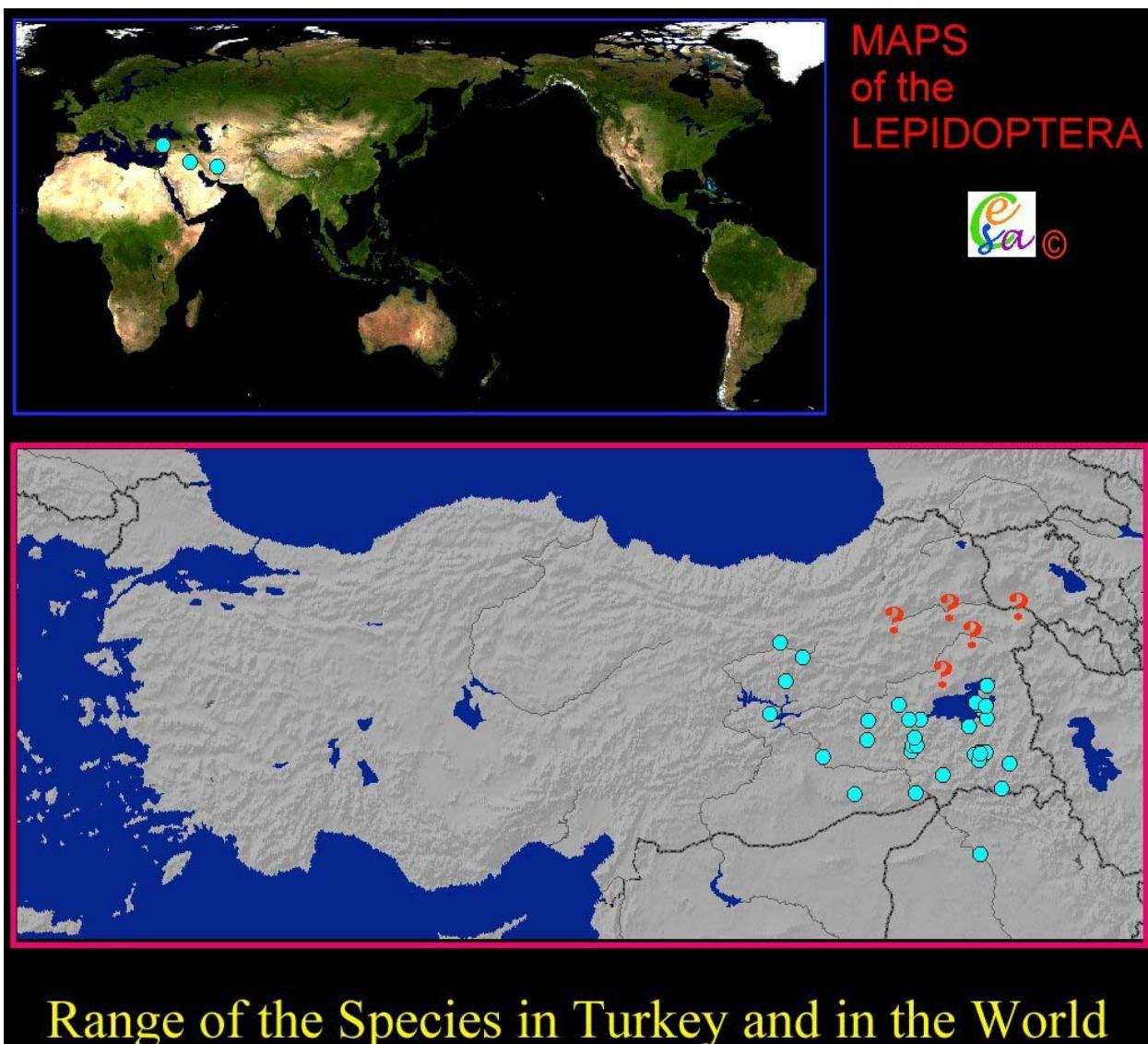
**Fig. 8** – Grown caterpillar of *Archon apollinaris*, with greyish ground colouration. In captivity, 23 5 2007, M.Kemal (Cesa)



**Fig. 9** – Pupa and pre-pupa of *Archon apollinaris*, in captivity. 7 6 2007. M.Kemal (Cesa)



**Fig. 10** – Pupae (ventral, dorsal, and lateral view) of *Archon apollinaris*, in captivity. 7 6 2007. M.Kemal (Cesa)



**Map 1** – Distribution of *Archon apollinaris*, based upon info-system of the Cesa.

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